

# PROJECT facts

DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
FEDERAL ENERGY TECHNOLOGY CENTER

ADVANCED CLEAN/EFFICIENT  
**POWER systems**

PS027.1297M

## PHOSPHORIC ACID FUEL CELL COMMERCIALIZATION

### Project Description

The ONSI Corporation of the U.S. is the only manufacturer of commercial phosphoric acid fuel cell (PAFC) units in the world. This company has the capability to produce 200 PC25™ units per year in its facility using robotics manufacturing and automated assembly techniques. The PC25™ converts 1900 SCF per hour of natural gas into 200 kW of grid-connected or grid-independent premium power and up to 750,000 Btu/hr of useful thermal energy at up to 250°F.

### PRIMARY PROJECT PARTNERS

**ONSI Corporation**  
South Windsor, CT

**Gas Research Institute**  
Chicago, IL

**Electric Power Research  
Institute**  
Palo Alto, CA

### Program Goals

More than 150 PC25 fuel cell power plants have been delivered from ONSI as of October 1997. One hundred and two (102) units are now operational at sites in the United States, Europe, and Asia.

Eleven (11) units have operated more than 30,000 hours with the first unit expected to surpass the 40,000 cell stack design life in late 1997. The longest continuous operation record has been set, and then surpassed by two units operating in the Tokyo Gas Company service territory. The first company record of 9,477 hours was set in September 1996. This was followed by a second Tokyo Gas Company unit which operated for 9,500 hours before being shut down for an inspection required by Japanese regulations.



The fleet continues to show an impressive availability, above 95%. The latest PC25™ design, the Model C, has entered service world-wide. Forty-six (46) Model C units are operating on three continents as of October 1997, and the world-wide fleet has now operated for a total of 1,660,000 power plant operating hours.

ONSI continues to focus on PC25™ manufacturing cost reduction, with lower costs expected as higher production volumes are achieved.

DOE's Office of Fossil Energy was instrumental in supporting the development of PAFC stack and system technology.

Continued efforts include a cooperative government/private sector partnership at no additional cost to the government.



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## Project Benefits

The PC25 demonstrates the technical viability and environmental cleanliness of fuel cell technology. These fuel cells have been sited, permitted, installed, started, operated, and maintained in a real world environment. The fleet continues to demonstrate reliable, safe operation in a variety of climates, applications, and service scenarios. Ambient temperatures range from sub-zero to plus 100°F. The table below shows the results from PC25 operation by U.S. owners. A significant premium power market is emerging for the PC25, in which the fuel cell's stable, and quality electric output is providing energy service to critical loads in commercial buildings. PC25s have been installed as back-up generators, as well as the primary source of supply for dedicated loads, replacing conventional uninterruptible power supplies. Other units are demonstrating the fuel flexibility of fuel cell power plants by operating on biomass illustrated by two recent awards:

- 1995 Cogeneration Project of the Year (Brooklyn Union, NY Installation) by the Cogeneration and Competitive Power Institute.
- 1994 Efficient Building Award for Energy and the Environment (Kaiser Permanente Medical Center Installation) by Energy User News.

## Major North American PC25 Owners' Findings

Category	Result	Comment
Target Installation Cost	\$50,000 to \$100,000	Simple and short interconnects
Permitting	Nothing unusual	Units have AGA approval/seal, some states have blanket EPA permits
Electrical Interfaces	Grid Connected and/or Grid Independent parallel	Widely accepted by electric utility
Maintenance	Over 9000 hours between major maintenance demonstrated	PC25C annual maintenance ONSI or other contractors available for maintenance
Availability	PC25A = 88.7% raw	Estimate 95+% with local parts and service PC25C expected to be 95+% raw

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